

Application No. 10/786,507
Filed: February 25, 2004
TC Art Unit: 3726
Confirmation No.: 4009

REMARKS

Claims 1, 2, 12, 13, and 15 have been rejected under 35 U.S.C. § 102(b) over Boyce et al. (US Pat. No. 4,808,461.) Reconsideration of this rejection is respectfully requested.

Claims 1 and 2 as amended emphasize the manufacture of composite material parts. The specification has been similarly amended for consistency with claims 1 and 2. No new matter has been entered by these amendments.

In claim 1, a process is defined including the steps of providing at least one porous fiber structure; consolidating the fiber structure by partial densification causing a deposit to bond the fibers of the fiber structure but leaving empty a major fraction of the initial porosity (reduction in porosity by no more than 40%); subsequently reinforcing the consolidated fiber structure by implanting rigid pins therethrough to obtain a fiber blank; and further densifying the fiber blank.

In claim 2, a process is defined including the steps of providing a plurality of porous fiber structures; consolidating each fiber structure (as in the process of claim 1); connecting the consolidated fiber structures together by implanting rigid pins in order to obtain a fiber blank having a desired shape resulting from the assembling of the consolidated fiber structures; and further densifying the fiber blank.

Application No. 10/786,507
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In the claims, "consolidation" refers to the formation of a deposit of refractory material within the porosity of the fiber structure. This deposit bonds fibers together to allow the fiber structure to be handled without losing its integrity. This is also clearly defined at various locations in the original speciation, such as on page 9, lines 1-15. The consolidated fiber structure remains porous, the initial pore volume being reduced by no more than 40%.

In claim 1, the implantation of rigid pins into the porous consolidated fiber structure aims at reinforcing the latter (page 11, lines 3-5), leading to obtaining a fiber blank in the form of a reinforced consolidated fiber structure. The composite material part is obtained by further densifying the fiber blank. See the specification at, for example, page 12, lines 24-33. In claim 2, the implantation of rigid pins into the consolidated fiber structures aims at linking them together (specification, page 13, lines 31-33). The composite material part is obtained by further densifying the fiber blank. See the specification in particular at page 14, lines 32-36.

Regarding the Boyce reference, the Examiner refers to the passage at col. 2, lines 30-68, disclosing a process illustrated by Figs. 4-7. In Boyce, a composite structure is formed from fibers embedded in a matrix resin and a reinforcement structure is placed on a surface of the composite structure. A processing cycle of elevated temperature and pressure is carried out to cause the elements (pins) of the reinforcement structure to penetrate into the composite structure and the resin to cure.

Application No. 10/786,507
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In the passage of col. 2, lines 47-51, Boyce mentions that pressure is applied to consolidate the composite laminate and enhance penetration action of the reinforcing elements. It is clear from Figs. 4-5 that the pressure exerted on bag 38 has the effect of causing the pins 14 to penetrate into the composite laminate 30.

However, merely because pressure is applied onto the composite laminate cannot be interpreted as meaning that the composite laminate is porous. It is clear that a laminate formed by preimpregnated fiber sheets (graphite-epoxy prepreg composite layup 30 (see col. 3, lines 30-35)) does not have the major porosity of the present invention, all the more that pressure is applied thereto.

In paragraph 6 of the Office Action, the Examiner seems to imply that the implantation of pins in the composite laminate of Boyce corresponds to a consolidation by reduction of pore volume. However, as mentioned above, there is no indication in Boyce that the composite laminate is porous. Schematic Figs. 4-6 can give no indication as to pore volume. In addition, there is no need to have a substantial porosity to drive pins in the composite laminate. The pins penetrate into the composite laminate under the effect of pressure like needles or nails.

Further, the word "consolidate" as used in Boyce (such as in line 49 of col. 2) refers to reinforcement by penetration of pins, not partial densification by forming a deposit that bonds fibers as defined in claims 1 and 2.

Application No. 10/786,507
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There is no disclosure in Boyce of such a consolidation step by partial densification prior to the introduction of rigid pins.

There is no disclosure in Boyce of a consolidation step by formation of a deposit within the porosity of fiber structures with a limited reduction of the pore volume (no more than 40%).

There is also no disclosure in Boyce of a further densification step carried out after the pins have been implanted.

Thus, claims 1 and 2 and the claims dependent therefrom are believed to be patentable over Boyce.

Claims 4-5 have been rejected under § 103(a) over Boyce et al. These claims are believed to be patentable for the reasons set forth with respect to claim 1 and no further comment thereon is believed necessary at this time.

Claims 6-11 have been rejected under § 103(a) over Boyce et al. in view of Applicants' admitted prior art. These claims are believed to be patentable for the reasons set forth with respect to claim 1 and no further comment thereon is believed necessary at this time.

Claim 14 has been rejected under § 103(a) over Boyce et al. in view of Childress (US Pat. No. 6,268,049). These claims are believed to be patentable for the reasons set forth with respect to claim 1 and no further comment thereon is believed necessary at this time.

Application No. 10/786,507
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In view of the above amendments and remarks, all claims are believed to be in condition for allowance, and reconsideration and indication of allowability are respectfully requested. The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite prosecution of the present application.

Respectfully submitted,

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-15-

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PAGE 17/17 * RCVD AT 7/26/2006 3:16:16 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-5/8 * DNIS:2738300 * CSID:6176950892 * DURATION (mm:ss):03:48